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Does Financial Technology and Financial Literacy Enhance Financial Inclusion? (Evidence from Several Countries)

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A B S T R A C T

This research aims to examine whether there is a relationship between financial literacy and financial technology with financial inclusion. Financial literacy in this context encompasses aspects of knowledge, skills, financial aspects, financial management, and access to financial knowledge. Meanwhile, financial technology includes digital financial services, financial behavioral intentions, and digital financial access. Financial inclusion covers financial stability, financial services, and digital finance. The methodology used in this research is qualitative research using literature studies, which include samples and data from 96 reputable international journals. The research was conducted from October until completion. The results of this study indicate that financial literacy and financial technology have a significant influence on financial inclusion.

INTRODUCTION

The Industry 4.0 revolution is a comprehensive digital transformation that combines intelligent systems to assist users in various activities, including enhancing development. In the ASEAN region, there exists a disparity in economic development and financial inclusion levels. The overarching focus on innovation within ASEAN revolves around connectivity, identified as one of the key strategic areas to enhance competitiveness and inclusivity. Financial inclusion, denoting the provision of financial services to individuals lacking bank accounts, presents a significant challenge. Efforts to address this challenge include initiatives aiming to boost GDP by 9-14% in countries like Indonesia and the Philippines, and a substantial 32% in Cambodia. The effectiveness of macroeconomic policies is intricately linked to financial inclusion, prompting the development of technologies such as digital financial services, payment cards, AI-supported Quick Response Code (QR) systems (QRis), Blockchain technology, and cryptocurrencies. These advancements play a pivotal role in fostering greater financial accessibility and inclusivity within the ASEAN region.

In Singapore, Malaysia, and Thailand, 80% have bank accounts and access to both informal and formal financial services. In Cambodia, Myanmar, Laos, and Vietnam, the percentage is low at 30%. Indonesia is also relatively low at 20%, attributed to geographical challenges with more than 17,000 islands and vast land. The emergence of fintech-based financial inclusion allows for investment in information and communication technology in Africa, followed by high potential for penetration and acceptance of technology-based services, reducing service provision costs. This attracts the attention of lending companies in Africa due to low financial inclusion and a low level of competition in the banking system (Sy et al., 2019).

Financial inclusion is enhanced through the branchless banking fintech program and investments in technology. Indonesian users emphasize the need for a harmonious partnership and collaboration between traditional banks and fintech companies to achieve a balance between the advantages and potential risks associated with financial services. The development of fintech is propelled by the National Financial Inclusion Strategy (SNIK), given the significant growth of the payment subsector, boasting 62 startup payment companies. Singapore hosts 100 fintech companies covering the entire spectrum, from payment services to wealth management, nurtured for growth after incubation in small domestic pairs. Malaysia has a growing fintech hub, leveraging the geographical proximity to neighboring countries like Singapore for innovation. Currently, China leads in fintech, facilitated by regulatory space for digital financial innovation, allowing the establishment of new types of financial service providers towards universal financial inclusion.

Indonesia strives to enhance financial inclusion and financial literacy through financial technology, aiming to improve the welfare of users. Financial inclusion is a key factor supporting development. In 2022, the financial inclusion index reached 85.10%, an increase compared to 2019, which was only 76.19% (OJK, 2022). These results indicate that there are users who do not yet understand the characteristics of products and financial services offered by formal financial institutions.

Perbandingan Indeks Literasi dan Inklusi Keuangan Tahun 2019 dan 2022

Indeks	2019	2022
Literasi	38,03%	49,68%
Inklusi	76,19%	85,10%
Gap	38,16%	35,42%

Sumber : OJK

Based on a survey by the Financial Services Authority, the financial literacy index in 2022 was 49.68 percent, an increase compared to 2019, which was only 38.03 percent. This index indicates that out of 100 inhabitants of Indonesia, there are 49 people who have an understanding of financial institutions and financial products. The lower the level of financial literacy, the more vulnerable users are to making wrong decisions. Additionally, users with low financial literacy are more susceptible to being deceived by promises of significant profits (Noor, Fourqoniah, and Aransyah, 2020). Moreover, low levels of financial literacy can trap individuals in financial problems as they are unable to plan for long-term financial goals and manage their finances (Yates et al., 2020). Both high and low levels of financial literacy affect an individual's understanding of the financial services industry. Good financial literacy means users know which financial services to choose according to their needs to improve financial well-being (Dhar, 2021). Users will make better decisions if they have a high level of financial literacy, effectively supporting the financial system using more advanced technology, thus enhancing financial inclusion. The objective of this analysis is to review whether there is a relationship between financial literacy and financial technology on financial inclusion through the journals referenced in this article.

The initial nationwide empirical study examining the correlation between financial literacy and financial inclusion across 143 countries (Klapper et al., 2015) paved the way for further exploration. This study established a key observation: a consistent association between higher financial literacy and enhanced financial inclusion at the country level. Given the intricate nature of financial development, it was imperative to scrutinize this relationship while accounting for potentially confounding country-specific factors. To address this, earlier researchers incorporated an extensive array of variables drawn from existing literature. These variables encompassed common country-related characteristics like per capita GDP and educational levels, as well as conventional financial infrastructure metrics (Allen et al., 2016). After thorough examination, these variables did not diminish the coefficient indicating that financial literacy has a significant relationship with financial inclusion.

The relationship between the two variables was established with cross-country evidence initially, and the study was expanded with a specific sample from one country to demonstrate high external validity. The investigation initiated by assessing the correlation between the percentage of individuals with financial literacy in a nation and four indicators of financial inclusion. The findings revealed a notable positive association between financial literacy and all four aspects of financial inclusion. These outcomes remained consistent even after adjusting for various country-specific, financial, and institutional factors. Moreover, we validated the causative interpretation of our findings through traditional Instrumental Variable (IV) methodologies and conducted a set of thorough examinations, incorporating contemporary IV techniques introduced by Lewbel (2012).

While the logical interpretation of these findings implies a causal relationship from financial literacy to financial inclusion, there is additional, more direct support for this argument. Micro-level studies, such as those conducted by Cole et al. (2011), Doi et al. (2014), and Jamison et al. (2014), offer evidence with high internal validity, indicating a positive influence of financial literacy on financial inclusion. However, these studies have specific samples and designs, raising questions about the generalizability of their results. Therefore, in conjunction with our Ordinary Least Squares (OLS) results, we advocate for an instrumental variable approach to enable causal inferences in our regression analysis.

Several studies have shown that fintech can enhance financial inclusion. Research conducted by (Farida, Soesatyo, and Aji, 2021), (Alawi, Asih, and Sobana, 2020), (Grohman et al., 2018), and (Noor, Fourqoniah, and Aransyah, 2020) found results indicating that financial literacy has a positive impact on financial inclusion, and the use of financial technology has a positive effect on financial inclusion. In contrast, the research findings by Sari and Kautsar (2020) suggest that fintech does not influence financial inclusion. The study by Mabula and Ping (2018) yielded results indicating that financial literacy is related to macro-level factors influencing financial inclusion.

THEORETICAL REVIEW

Teori of Planned Behavior

This theory suggests that people will make decisions based on their confidence in the information they receive, concentrating on consciously acquiring knowledge to guide their individual actions. There are several considerations related to individual behavior: Personalities, Socials, and Information (Sari and Kautsar, 2020). Personality factors are relevant in representing financial attitudes and behaviors, as well as financial knowledge related to individual decision-making and influenced by financial literacy. In the realm of financial technology, the significance of information factors lies in their connection to knowledge and proficiency in utilizing financial technology. In the context of financial technology, this pertains to individual decision-making, reflecting the concept of financial inclusion. In this theory, it is explained that individual decision-making is influenced by confidence in information based on personality and information factors, representing financial technology (Asandimitra and Kautsar, 2019; Sari and Kautsar, 2020).

Financial Technologi

Ross Levine and Sara Zervos discovered that financial markets play a pivotal role in bolstering a nation's long-term economic growth by offering essential services. Presently, there is a transformative shift in the financial industry driven by technology, commonly known as financial technology or fintech. The International Finance Corporation (IFC) reported substantial growth in fintech, with investments surging from $12.2 billion in 2014 to an impressive $19 billion in 2016. Fintech encompasses a range of financial products developed by diverse institutions to convert public needs into accessible financial solutions, enabling users to easily access a variety of financial products. Fintech is used as a representation of technology that makes efforts to improve and automate the use of financial services. Ozili (2018) states that fintech is used to assist companies, business owners, and consumers in managing financial operations, processes, and life better through the use of specialized software and algorithms on computers and smartphones.

Financial technology (fintech) is an independent variable in this study, analyzed using bibliometric analysis and the application of VOSviewer. There are various testing techniques, such as the study by H. Banna et al. (2022) employing econometric analysis, which found that fintech is crucial for reducing risk-taking by Microfinance Institutions (MFIs) on a small scale as a strategy to support fintech in enhancing financial inclusion and as a means to achieve operational stability. Based on research by Hutabarat (2018), Romadhon, I. A., & Rahmadi, H. (2020), and Borrego A. (2021), it is found that fintech has an impact on financial inclusion.

H1 : Financial technology influences financial inclusion

Financial Literacy

Financial literacy is a skill or capability of an individual to know and understand financial perspectives and risks, skills, and self-confidence to make informed decisions in order to advance their personal financial well-being" (Morgan & Trinh, 2022). I Nyoman Patra Kusuma (2019) states that financial literacy is knowledge, skills, and beliefs that influence attitudes and behaviors to enhance the quality of decision-making and financial management for the purpose of achieving well-being. Financial literacy is the integration of knowledge and skills in financial matters, used wisely (Iko Putri Yanti, 2019).

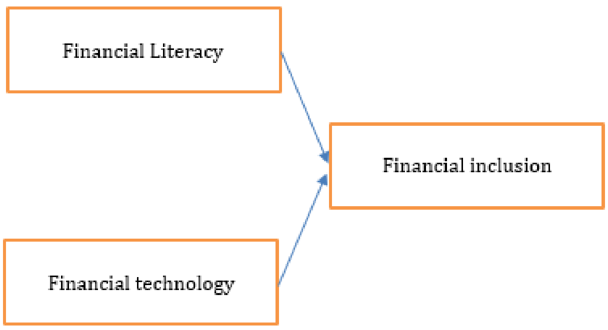
In testing the influence of financial literacy on financial inclusion, there are several research aspects such as Gender, Financial access, Use of financial services, Country characteristics, National infrastructure, and Characteristics of financial institutions. A study by A Grohman et al., (2018) found a positive relationship between financial access and financial inclusion using two indicators, namely bank branch penetration and ease of use, demonstrated by the demand side in the form of financial literacy playing a crucial role in accessing finance. Financial literacy influences financial decision-making, where individuals with low literacy levels are less likely to invest. Inclusive financial development requires improved financial literacy and its application in making financial decisions (Shen et al., 2018). This statement is supported by Shen et al., (2018); Sari and Kautsar (2020); Erlianta et al., (2021); and Brika, S. K. M. (2022), who have research findings that financial literacy has a positive impact on financial inclusion, where the development of financial inclusion requires the role of financial literacy to maximize the improvement of financial inclusion. On the other hand, research conducted by I Romadhon and H. Rahmadi (2020) resulted in financial literacy not influencing financial inclusion.

H2 : Financial literacy influences financial inclusion

Financial Inclusion

As per Presidential Regulation of the Republic of Indonesia Number 82 of 2016 on the National Strategy for Financial Inclusion, financial inclusion holds a crucial role in the broader context of social and economic integration. It actively contributes to driving economic growth, ensuring stability in the financial system, supporting initiatives for poverty alleviation, and mitigating disparities among individuals and regions. Financial inclusion is defined, according to the Financial Services Authority (OJK) in 2017, as comprehensive efforts aimed at eliminating both cost and non-cost barriers to enable users to access financial services. In practical terms, financial inclusion, as described by Kerthayasa, I. W., & Darmayanti, N. P. A. in 2023, refers to the capability of users to access a variety of high-quality formal financial services in a timely, convenient, and well-informed manner.

Users of formal financial services will detect active or inactive users of financial services. The sufficiency of active users of financial services will affect financial stability. This involves the correlation between financial stability and financial inclusion, which has a positive impact (P.K. Ozili, 2020). In choosing formal financial services, high financial literacy is required to make the best decisions. The improvement of financial literacy is facilitated through financial technology. This research is related to three strands of literature, namely (i) financial inclusion at the national level, financial technology, and (ii) financial literacy.



Conceptual Framework

METHODOLOGY

This study is a qualitative research using descriptive analysis with a literature review approach, utilizing data on financial literacy, fintech, and financial inclusion in ASEAN, China, and Africa for the period 2019-2023 that has been published as international scholarly journals related to financial literacy, financial technology, and financial inclusion. This analysis serves as a review article presenting knowledge and substantive findings, as well as theoretical and methodological contributions to a specific topic.

The literature search employed diverse sources such as Scopus, Mendeley, ScienceDirect, Emerald Insight, DOAJ, and reputable financial journals, based on comprehensive coverage with reputable journals, excluding non-scholarly sources that align with the research objectives (Khan et al., 2022; Huang et al., 2019).

Data Collection and Inclusion Criteria

The data collection process began by searching for articles with comprehensive criteria using a database in titles, abstracts, or keyword lists; "Fintech" or "Financial Literacy" or "Financial inclusion," resulting in 6,997 scholarly works. The results were narrowed down by adding search criteria such as "Gender," "Digital finance," "Financial access," "Financial planning," "use of financial services," and "Financial stability," resulting in 1,066 scholarly works. Afterward, the scope of the articles was limited to those published in English in the fields of economics, management, and finance, totaling 324 scholarly works. Subsequently, the scholarly works were further narrowed down to include only articles published between 2019 and 2023, resulting in 96 articles forming the basis of this bibliometric study.

The research utilized Mendeley Desktop and VOSviewer version 1.6.19 as research tools. VOSviewer was employed for bibliometric analysis and visualization of literature data, enabling researchers to illustrate relationships among keywords, authors, data sources, journals, and related topics identified in the literature. This facilitates a better understanding of trends, patterns, and connections among these elements in the literature. The technical data analysis process involves:

1. Once the required references have been gathered, all references will be imported into Mendeley. Keywords used in each reference will be filled in, and the references will be saved in RIS file format.
2. Importing the RIS file into VOSviewer with the aim of mapping bibliometric network visualizations.
3. Mapping research topics based on the literature review study.

Furthermore, this research applies qualitative analysis methods to comprehend the main findings and implications from the collected literature. Qualitative analysis involves a deep understanding of the theoretical foundations of Financial Inclusion, Financial Literacy, and Financial Technology, as well as the identification of similarities and differences in findings from various sources.

The results of the literature analysis and data visualization using VOSviewer will serve as the foundation for compiling the research report. This research report will include a Literature Review summarizing key findings from the analyzed literature, as well as implications of the analysis results to enhance understanding of the influence of Financial Literacy and Financial Technology on Financial Inclusion.

Therefore, the methodological approach employed in this research involves literature analysis, bibliometric analysis using VOSviewer, and qualitative analysis to uncover important insights into the influence of Financial Literacy and Financial Technology on Financial Inclusion.

RESULTS AND DISCUSSION

Mapping the Distribution of Scientific Publications on the Influence of Financial Literacy and Financial Technology on Financial Inclusion.

There are 96 reputable journals from various sources spanning the period between 2019 and 2023. These journals serve as the latest references, ensuring the generation of accurate data.

Publication Year	Number of publications
2019	14
2020	9
2021	17
2022	27
2023	29

Tabel 1. Publication data on the Impact of Financial Literacy and Financial Technology on Financial Inclusion

Several countries are the subject of this research, namely the countries that are part of ASEAN, Africa, and China. This allows researchers to analyze aspects influencing financial literacy, serving as a roadmap in financial education programs and the creation of global standards or recommendations for financial literacy.

Bibliometric Mapping of Research on the Impact of Financial Literacy and Financial Technology on Financial Inclusion

There are several considerations in obtaining results from bibliometric analysis using VOSviewer. Firstly, ensure that the data input into VOSviewer is complete and accurate as it will affect the resulting bibliometric analysis. Secondly, pay attention to how the data is grouped; in this case, VOSviewer can group data based on keywords, authors, sources, or specific topics. Thirdly, ensure that the time range and the amount of data used reflect the research questions or analysis objectives. The quantity of data, whether too large or too small, can affect the interpretation of results. Fourthly, choose bibliometric metrics that are appropriate for the research objectives. Some common metrics involve the number of citations, journal impact factor, and so on. Adjust the metrics to the research context. Fifthly, set visualization parameters carefully. A good understanding of how nodes are connected can provide deeper insights. Larger nodes in the diagram represent more cited publications and help understand how publications are related to each other.

The results of collecting scholarly articles from various sources were exported in RIS (Research Information System) format, then input and analyzed using VOSviewer. The outcome is a visualization of a network on the co-word map related to the Impact of Financial Literacy and Financial Technology on Financial Inclusion, divided into 11 clusters and 26 items, as can be seen in the following image:

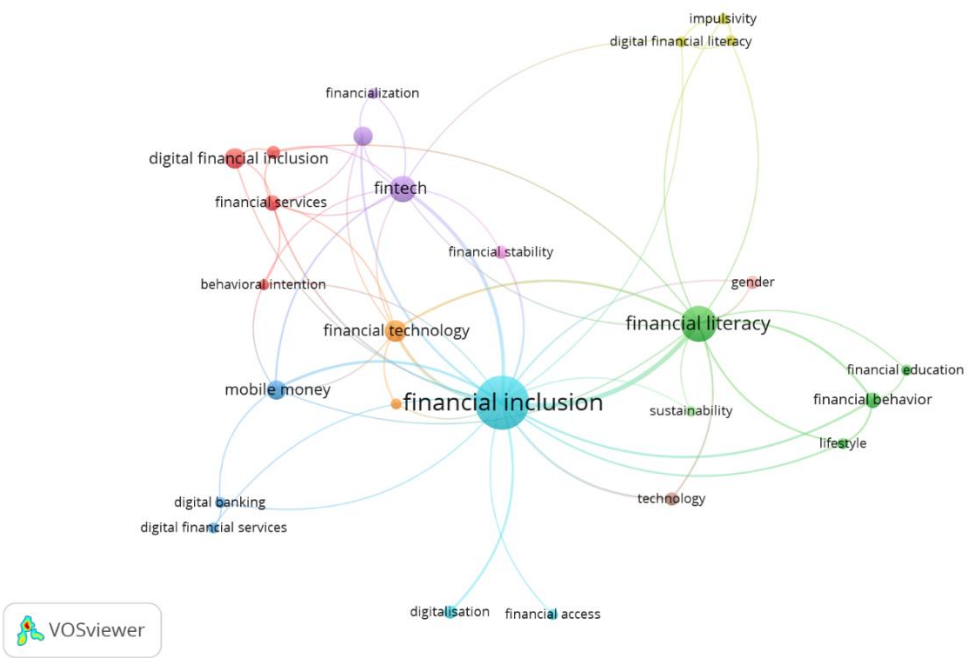


Figure 2. The network visualization map of research on the Impact of Financial Literacy and Financial Technology on Financial Inclusion.

Sumber : VOSviewer 1.6.19

- Cluster 1, Red Color, Formed from 4 items: Behavioral Intention, Digital Financial Inclusion, Digital Payments, and Financial Service.
- Cluster 2, Dark Green Color, Formed from 4 Items: Financial Behavior, Financial Education, Financial Literacy, and Lifestyle.
- Cluster 3, Dark Blue Color, Formed from 3 items: Digital Banking, Digital Financial Services, and Mobile Money.
- Cluster 4, Yellow Color, Formed from 4 items: Digital Finance Literacy, Financial Capability, and Impulsivity.
- Cluster 5, Purple Color, Formed from 3 items: Digital Finance, Financialization, and Fintech.
- Cluster 6, Light Blue Color, Formed from 3 items: Digitalization, Financial Access, and Financial Inclusion.
- Cluster 7, Orange Color, Formed from 2 items: Financial Technology and

Microfinance Institution.

- Cluster 8, Brown Color, Formed from 1 item: Technology.
- Cluster 9, Pink Color, Formed from 1 item: Financial Stability.
- Cluster 10, Peach Color, Formed from 1 item: Gender.
- Cluster 11, Old Color, Formed from 1 item: Sustainability.

Based on the image, it is known that there is intensity among keywords in the literature. Higher values indicate a stronger network, while lower values suggest weaker correlations in this research. Figure 2 shows that the keyword network with the topic of financial inclusion is more prominent with a total strength of 108. This is followed by financial literacy with a total strength of 32. Gender is also a central theme, with keywords such as gender differences and gender inequality having relatively high strength. Other important keywords such as Behavioral Intention, Digital Financial Inclusion, Digital Payments, Financial Service, Financial Behavior, Financial Education, Lifestyle, Digital Banking, Digital Financial Services, Mobile Money, Digital Finance Literacy, Financial Capability, Impulsivity, Digital Finance, Financialization, Fintech, Digitalization, Financial Access, Financial Technology, and Microfinance Institution are relevant to the discussion of financial literacy and financial technology's impact on financial inclusion. Some keywords like technology, financial stability, and sustainability have relatively low occurrence rates and relationship strengths, indicating that these keywords may be less frequently studied.

The image below is an overlay visualization, explaining that the references used in this study are within the time range from 2019 to 2023.

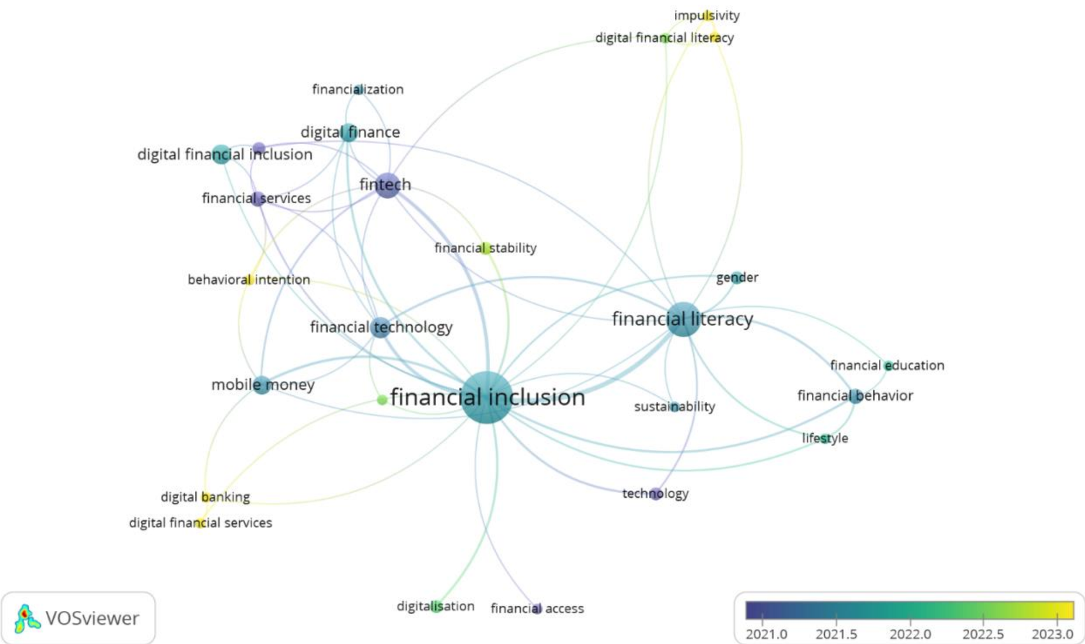


Figure 3 Overlay Visualization

The Impact of Financial Literacy on Financial Inclusion

Financial literacy serves as an influence in improving the quality of decision-making and financial management through knowledge, skills, and confidence. A lack of understanding of financial aspects tends to make individuals unable to choose suitable financial services. On the other hand, when someone has a high level of financial literacy, they are more likely to make the best decisions in managing their finances based on needs and financial planning, thus achieving prosperity. This, in turn, can enhance financial inclusion.

Research by Prasad et al. (2018), Rahayu and Putra (2019), A. Detunji and David West (2019), Morgan, P. J., & Long, T. Q. (2020), Shen, Hueng, and Hu (2020), Sari et al. (2022) found that financial literacy has a positive impact on financial inclusion.

Based on the analyzed research, there is an indication of a positive correlation between financial literacy and financial inclusion. In the study by Morgan, P.J., & Long, T.Q. (2020), it was found that gender does not have an influence on the relationship between financial literacy and financial inclusion. Additionally, financial access was identified as an important aspect for improving financial inclusion.

Therefore, it can be concluded that financial literacy is a crucial aspect and component, where accessibility to financial services serves as a significant guideline and material in financial literacy that enhances financial inclusion.

The Impact of Financial Technology on Financial Inclusion

The rapid development of technology affects financial stability. Financial technology transforms the landscape of financial services, impacting both financial institutions and non-financial new service providers in the market. This enhances the quality and reach of financial services (Makina, D. 2019).

According to Ozili's (2021) study, digital financial services contribute to the growth of debit cards, credit cards, and electronic payment channels, thereby mitigating risks in the financial sector of developed nations. Nonetheless, this impact is not evident in transition economies and developing countries. The integration of digital finance with an augmented number of formal account holders enhances the overall financial sector. Additionally, studies conducted by Sennou, Outtara, and Acclassato Houensou (2019); Makina, D. (2019); P.K. Ozili (2020); Sari et al., 2022 found that financial technology has an impact on financial inclusion.

From the findings, it can be concluded that financial technology has a positive impact on financial inclusion. This is influenced by the high use of financial technology, which supports the improvement of financial inclusion. Users find it easier to understand the use of products and digital financial services. The easier it is for users to access financial services, the higher financial inclusion will be, contributing to the well-being of the users.

CONCLUSIONS AND RECOMMENDATIONS

In order to understand the influence of financial literacy and financial technology on financial inclusion, this literature review presents important findings regarding the impact of these three variables. Financial literacy leans more towards knowledge, skills in financial aspects, financial management, and access to financial knowledge. It has been proven that the higher the financial literacy, the greater the improvement in financial inclusion. On the other hand, financial technology leans more towards digital financial services, financial behavior intentions, and digital financial access, proving to have a significant impact on financial inclusion.

The results of this literature review confirm that both variables, financial literacy and financial technology, have a significant impact on financial inclusion. These two variables can complement each other to enhance financial inclusion. Awareness among users of financial services and easy access to financial services can be effective strategies to improve financial inclusion, ensuring the well-being of users.

This literature review provides knowledge and understanding of the importance of financial literacy and financial technology in improving financial inclusion, which will be a strategy for well-being in the future. For future research, it is recommended to include additional variables and a broader range of subjects to explore comparisons among studies.

FURTHER STUDY

The limitation of this study lies in the relatively limited number of collected references. Therefore, for future researchers, it is recommended to explore and include a more comprehensive range of references to ensure the accuracy and completeness of research findings

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